



**National
Aerospace
Laboratories**

Class Unrestricted

No. of copies 25

Title Development of Digital Particle Image Velocimetry

Author/s G.Ramesh
K.T.Madhavan

Division EAD

NAL Project No. E-1-188

Document No. PD EA 0108

Date of issue March 2001

Contents 27 **Pages** 18 **Figures** 0 **Tables** 33 **References**

External Participation

Sponsor AD&DB

Approval Head, Experimental Aerodynamics Division

P.R. Kowth

Remarks Project is successfully completed

Keywords DPIV, pulsed laser, light sheet, cross correlation, elliptic jet, axis-switch

Abstract

Development of a Digital PIV system at NAL and its application in the near field of a small aspect ratio elliptic jet, for validation of PIV data has been reported. The development work included the integration of sub-systems and development of processing algorithms for PIV data. Program for vector extraction using cross correlation and pattern matching technique were carried out. DPIV studies in small aspect ratio elliptic jet was carried out with the twin objectives viz. Validation of DPIV measurements and to study near field of elliptic jet flow towards better understanding of some aspects of flow development.

The measurement apart from instantaneous velocity fields includes the mean, turbulence intensities and Reynolds stress in the major and minor planes at moderate Reynolds number. The comparison with conventional measurements is presented wherever possible and the deviations are interpreted. The jet growth in the major and minor planes has been found to be different and the phenomenon of axis switching is found to occur at about five equivalent diameters of the jet.